REMARKS

In the Action, claims 1-34 are rejected. In response, new claims 35-37 are added to depend from claims 1, 2 and 3, respectively, to recite that the nanotubes are vertically aligned with respect to the base. This feature is disclosed on page 10, line 17 of the specification. The pending claims in this application are claims 1-37, with claims 1, 2 and 3 being independent.

In view of the amendments and the following comments, reconsideration and allowance are requested.

Rejection of Claims 1-34

Claims 1-34 are rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 6,097,138 to Nakamoto in view of U.S. Patent No. 6,436,221 to Chang et al. Nakamoto is cited for disclosing a process of forming nanotubes on a substrate and then applying a conductive material over the substrate. Chang is cited as allegedly disclosing a taping method and transferring nanotubes from one substrate to another. The rejection is based on the position that it would be obvious to modify the process of Nakamoto according to Chang et al. For the reasons discussed below, Applicants submit that it would not have been obvious to modify Nakamoto. Furthermore, the proposed modification would not result in the claimed invention.

Claims 1, 2 and 3 recite the steps of forming a aligned nanotube film on a basic substrate, applying a pattern of a conductive base and bonding the conductive base to the nanotubes, and thereafter removing the conductive base to remove those portions of the nanotube film that are adhered to the conductive base while leaving the remaining portions attached to the basic substrate. Nakamoto and Chang et al. do not disclose or suggest forming an aligned carbon nanotube film on a basic substrate, forming a patterned conductive

binder layer on the ends of the nanotubes, bonding the conductive binder layer to the nanotubes and thereafter removing the conductive layer with the portion of the nanotube film adhered to the conductive binder.

In the present invention, the carbon nanotubes are prepared to provide a specific length, alignment and density. After the carbon nanotube film is formed, the nanotubes are transferred to an electrode (the conductive binder layer) by patterning and separating the conductive binder layer from the nanotube film. In this manner, the nanotubes transferred to the electrode are arranged in the appropriate alignment.

The emitter of the claimed invention enables the electrons to move from the electrode to the nanotubes where the electrons are emitted. The nanotubes are good conductors which enable the emitter to function properly. Thus, the applied voltage is effectively utilized due to the low electric resistance that is encountered.

Nakamoto discloses applying a resist layer to the nanotubes and then patterning the nanotubes by lithography. The Action refers to column 8, lines 36-64 of Nakamoto. However, this passage refers to the embodiment of Figure 5A where the conductive layer 34 is deposited on the entire surface of the substrate 12 and is subsequently patterned by lithography. There is no suggestion of patterning the conductive layer on the nanotubes so that the nanotubes can be transferred to the conductive layer. Chang et al. discloses only a taping step to remove loose and poorly attached nanotubes. There is no suggestion of the taping to transfer aligned nanotubes to a conductive binder. Therefore, Chang et al. provides no motivation or incentive to modify Nakamoto in the manner suggested in the Action. Even if one were to combine the teachings of Nakamoto and Chang et al., the result would not be the claimed invention.

Nakamoto also fails to disclose aligned nanotubes as in the claimed invention. As disclosed in the specification and as recited in new claims 35-37, the nanotubes are vertically

aligned with respect to the basic substrate. Nakamoto discloses that the carbon nanotubes "normally exist like fallen trees overlapping each other". Thus, the nanotubes are not aligned as in claims 1, 2 and 3 and not vertically aligned with respect to the basic substrate.

Nakamoto discloses two methods for forming the nanotube layer. The first applies a carbon nanotube powder by compressing or filling. The second method sublimes the material directly on the substrate to form the nanotubes. The powder form of the nanotubes have different lengths and alignments. The density of the nanotubes in the layer formed by flocculating the powder can vary to produce areas of high and low concentrations of nanotubes. This results in the layer of the nanotubes having different heights, densities, and alignment which cannot be changed by resist patterning.

Nakamoto does not disclose forming a nanotube layer to arrange the length, alignment and density of the nanotubes or the height of the deposit. Therefore, the methods of Nakamoto do not produce the aligned layer of nanotubes where the nanotubes are perpendicular to the surface. As shown in the drawings and as disclosed by Nakamoto, the nanotubes are random with a portion of the nanotubes being parallel to the surface.

In addition, the emitter according to Nakamoto made by depositing the layer of nanotubes, receives the electrons by contacting an electrode and the nanotubes. The electrons are emitted at the surface in a different manner than the present invention as a result of the random orientation of the nanotubes.

Chang et al. is directed to a method of a nanotube layer by screen printing using a paste that contains nanotubes. As disclosed in the present specification, forming an emitter from a paste containing nanotubes by printing on the electrode has various disadvantages. The invention seeks to overcome the disadvantages of the prior processes. The method of Chang et al. uses the adhesive tape as a method of napping nanotubes buried in a paste or removing the nanotubes that poorly adhered to the paste or substrate. The method of Chang

et al. is not able to arrange the density and height of napped nanotubes because of the random nap of the nanotubes. Moreover, the binder component is attached to the nanotubes when mixed which produces a barrier to the electron emission.

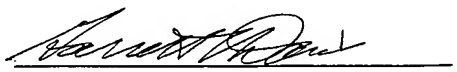
Therefore, the methods of Nakamoto and Chang et al. have no relation to the claimed invention. Accordingly, claims 1, 2 and 3 would not have been obvious over the combination of Nakamoto and Chang et al.

Nakamoto and Chang et al. also fail to disclose bonding a conductive binder to a surface of the nanotubes that has been transferred to the flexible substrate as in claims 2 and 3. Accordingly, these claims are not obvious.

Claims 4-37 depend directly or indirectly from claims 1, 2 or 3 to recite additional features of the invention that are not disclosed in the cited art. The cited patents do not disclose the methods of forming the carbon nanotubes, or the compounds that form the nanotubes in combination with the method steps of claims 1, 2 or 3. Accordingly, claims 4-37 are not obvious.

In view of the above comments, reconsideration and allowance are requested.

Respectfully submitted,



Garrett V. Davis
Reg. No. 32,023

Roylance, Abrams, Berdo & Goodman, L.L.P.
1300 19th Street, N.W., Suite 600
Washington, D.C. 20036
(202) 659-9076

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